

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 23 NOV 2004

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Applicant's or agent's file reference 2002-P1809(PCT)	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International Application No. PCT/SG2002/000109	International Filing Date (day/month/year) 3 June 2002	Priority Date (day/month/year) 3 June 2002
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ E04B 1/94, C09D 175/04, C09D 175/06, C09D 5/18, C09D 1/00, C09D 1/02, C09D 185/02, C09K 21/02, C09K 21/06		
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1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheet(s).

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11 December 2003	Date of completion of the report 16 NOV 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer JAMES DZIEDZIC Telephone No. (02) 6283 2495

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages 1-23, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 24-29, received on 12 November 2004 with the letter of 12 November 2004
- ☒ the drawings, pages 1/3 – 3/3, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 8, 9, 12-14, 22-28	YES
	Claims 1-7, 10-11, 15-21, 29-35	NO
Inventive step (IS)	Claims 8, 9, 12-14, 22-28	YES
	Claims 1-7, 10-11, 15-21, 29-35	NO
Industrial applicability (IA)	Claims 1-35	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

- D1. Derwent Abstract Accession No. 02364K/02, class A93, DE 3115456 A1 (STEFFENS, J.) 30 December 1982
- D2. DE 19910257 A1 (E.SCHWENK DAMMTECHNIK GMBH & CO KG) 21 September 2000
- D3. EP 0224945 A1 (SHELL INTERNATIONALE RESEARCH MAATSHAPPIJ B.V.) 10 June 1987
- D4. WO 2001/072863 A1 (APACHE PRODUCTS COMPANY) 4 October 2001
- D5. EP 0942107 A2 (SALAMANDER INDUSTRIE-PRODUKTE GMBH) 15 September 1999
- D6. GB 1158591 A (REDFARN, C.A.) 16 July 1969
- D7. US 4931481 A (Adam et al) 5 June 1990
- D8. WO 1994/024226 A1 (CHEMISCHE FABRIK GRUNAU GMBH) 27 October 1994

NOVELTY (N) claims 1-7, 10-11, 15-21, 29-35

The invention defined in claims 1-7, 10-11, 15-21, 29-35 is not considered novel in light of the prior art documents D1-D8 for the following reasons.

D1 discloses (see abstract) the production of insulation material by coating foamed particles (expanded polystyrene) with a fire resistant material (aqueous solution of potassium silicate) and contacting the coated particles with a binder (polyurethane).

D2 discloses (see column 3 lines 49-67 and Examples) the production of insulation material by coating foamed particles (polystyrene) with a binder and fire resistant material (phenolic resin and expanded graphite).

D3 discloses (see page 4 lines 29-34) the production of polyurethane insulation material by coating particles (polytetrafluoroethylene) with a fire resistant material (REOFLAME®) and contacting the coated particles with a binder (polyurethane).

D4 discloses (see page 2 line 26 to page 3 line 3 and Example 7) the production of insulation material by coating foam polymer (graphite/isocyanate) with a fire resistant material (Antiblaze®).

D5 discloses (see Claim 11) the production of insulation material by soaking foam polymer (polyurethane) with a fire resistant material (phosphate).

D6 discloses (see page 1 lines 15-20) the production of insulation material by incorporating a fire resistant material in a foam polymer (polyurethane).

D7 discloses (see column 2 lines 28-46) the production of insulation material by incorporating a fire resistant material (Magnesium hydroxide) in a foam polymer (polyurethane).

Supplemental Box

be used when the space in any of the preceding boxes is not sufficient)

Continuation of Box V

D8 discloses (see Example 1) the production of an insulation material by coating foam particles (polyurethane and polyethylene) with a fire resistant material and binder (calcium borate and low-alkali glass powder).

INVENTIVE STEP (IS) claims 1-7, 10-11, 15-21, 29-35

The invention defined in claims 1-7, 10-11, 15-21, 29-35 are not considered to involve an inventive step when compared with prior art documents D1-D8 for those reasons given in the above novelty statement.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An insulation material that includes (a) particles of a combustible insulation material that are coated with a fire resistant material and bonded together with a binder material and/or (b) an open celled foam of the combustible insulation material having internal surfaces coated with the fire resistant material.
2. The insulation material defined in claim 1 wherein the fire resistant material is an intumescent material.
3. The insulation material defined in claim 1 or claim 2 wherein the binder material at least substantially fills interstices between coated particles.
4. The insulation material defined in claim 3 wherein the binder material is the coating material.
5. The insulation material defined in any one of the preceding claims wherein the particles are at least substantially encapsulated by the fire resistant material.
6. The insulation material defined in any one of the preceding claims wherein the particles include a fire retardant material.
7. The insulation material defined in any one of the preceding claims wherein the coating material for the particles and/or the binder

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material that binds the particles together have water-proofing and/or vapor-proofing properties.

- 5 8. The insulation material defined in any one of the preceding claims wherein the coating material and/or the binder material include fibre reinforcement that improves the mechanical properties of the insulation material.
- 10 9. The insulation material defined in any one of the preceding claims wherein the combustible insulation material includes recycled insulation material.
- 15 10. A method of manufacturing an insulation material that includes coating particles of combustible insulation material with a fire resistant material.
- 20 11. The method defined in claim 10 includes coating particles of combustible insulation material with a liquid form of the fire resistant material.
- 25 12. The method defined in claim 11 further includes transferring the particles with the wet coating of the fire resistant material into a mould, filling the interstices with further liquid fire resistant material, and removing the insulation material from the mould after the liquid fire resistant material has dried or set to a sufficient extent.
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- 35 13. The method defined in claim 11 further includes transferring coated particles into a mould after the liquid form of the fire resistant material has dried into a solid form, filling the

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5 interstices between the particles in the mould
with a liquid binder material, and removing the
insulation material from the mould after the
liquid binder material has dried or set to a
sufficient extent.

14. The method defined in claim 11 further includes
transferring coated particles into a mould after
the liquid form of the fire resistant material
10 has dried into a solid form, filling the
interstices between the particles in the mould
with a polyurethane or polyisocyanurate foamable
mixture, and removing the insulation from the
mould after the foamable mixture has reacted and
15 formed a foam product.

15. The method defined in claim 10 includes forming
free-flowing loose-fill agglomerates of the
coated particles.

20 16. The method defined in claim 10 includes forming
free flowing loose-fill agglomerates of the
coated particles and with a binder material that
sets to hold the particles together.

25 17. The method defined in claim 10 includes forming
panels or other shaped products from the coated
particles.

30 18. The method defined in claim 17 includes forming
panels or other shaped products by mixing the
coated particles with a binder material.

35 19. The method defined in claim 18 wherein the
binder material at least substantially fills
interstices between coated particles in the
products.

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20. The method defined in any one of claims 17 to 19 includes forming panels or other shaped products having a uniform distribution of coated particles, whereby the insulation material can resist a fire coming from any direction.
21. The method defined in any one of claims 17 to 20 includes applying metal facings or non-metal facings to the panels or other shaped products.
22. The method defined in any one of claims 10 to 20 includes manufacturing the insulation material from particles having a range of different particle sizes.
23. The method defined in any one of claims 10 to 22 includes manufacturing the insulation material by coating the particles with a range of different coating thicknesses.
24. The method defined in any one of claims 10 to 23 includes manufacturing the insulation material with layers of different sized particles and/or different coating thicknesses so that the insulation and fire resistance properties of the insulation material varies through its cross section.
25. The method defined in claim 24 includes manufacturing the insulation material with smaller particles and a thicker fire resistant coating located near the surfaces of the material and larger particles and a thinner coating located in the interior.

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26. The method defined in claim 24 or claim 25 includes forming the layers with a binder material to hold the particles together within a layer and to hold the layers together.
- 5 27. The method defined in claim 26 includes incorporating microspheres of glass or ceramic material (a) into the adhesive layer binding the facings to the insulation particles to improve the fire resistance at that boundary and/or (b) in the binder material as a filler to reduce the interstices between particles and thereby improve the insulation and the fire resistance.
- 10 28. The method defined in claim 27 wherein the microspheres are hollow.
- 15 29. The method defined in any one of claims 10 to 28 includes manufacturing the insulation material from particles of different insulation materials.
- 20 30. The method defined in claim 29 includes manufacturing the insulation material from combustible insulation materials and incombustible insulation materials.
- 25 31. A method of manufacturing an insulation material that includes coating an open celled foam of a combustible insulation material with a material that is fire resistant and contributes to the rigidity of the insulation material.
- 30 32. The method defined in claim 31 includes coating the open celled foam by impregnating the foam with the fire resistant material.
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33. The method defined in claim 31 or claim 32 wherein the insulation material is suitable for structural applications.
- 5 34. The method defined in any one of claims 31 to 33 wherein the fire resistant material is sodium silicate or an intumescent material.
- 10 35. A product that includes the insulation material defined in any one of claims 1 to 9.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An insulation material that includes (a) particles of a combustible insulation material that are coated with a fire resistant material and bonded together with a binder material and/or (b) an open celled foam of the combustible insulation material having internal surfaces coated with the fire resistant material.
2. The insulation material defined in claim 1 wherein the fire resistant material is an intumescent material.
3. The insulation material defined in claim 1 or claim 2 wherein the binder material at least substantially fills interstices between coated particles.
4. The insulation material defined in claim 3 wherein the binder material is the coating material.
5. The insulation material defined in any one of the preceding claims wherein the particles are at least substantially encapsulated by the fire resistant material.
6. The insulation material defined in any one of the preceding claims wherein the particles include a fire retardant material.
7. The insulation material defined in any one of the preceding claims wherein the coating material for the particles and/or the binder

material that binds the particles together have water-proofing and/or vapor-proofing properties.

- 5 8. The insulation material defined in any one of the preceding claims wherein the coating material and/or the binder material include fibre reinforcement that improves the mechanical properties of the insulation material.
- 10 9. The insulation material defined in any one of the preceding claims wherein the combustible insulation material includes recycled insulation material.
- 15 10. A method of manufacturing an insulation material that includes coating particles of combustible insulation material with a fire resistant material.
- 20 11. The method defined in claim 10 includes coating particles of combustible insulation material with a liquid form of the fire resistant material.
- 25 12. The method defined in claim 11 further includes transferring the particles with the wet coating of the fire resistant material into a mould, filling the interstices with further liquid fire resistant material, and removing the insulation material from the mould after the liquid fire resistant material has dried or set to a sufficient extent.
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- 35 13. The method defined in claim 11 further includes transferring coated particles into a mould after the liquid form of the fire resistant material has dried into a solid form, filling the

interstices between the particles in the mould with a liquid binder material, and removing the insulation material from the mould after the liquid binder material has dried or set to a sufficient extent.

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14. The method defined in claim 11 further includes transferring coated particles into a mould after the liquid form of the fire resistant material has dried into a solid form, filling the interstices between the particles in the mould with a polyurethane or polyisocyanurate foamable mixture, and removing the insulation from the mould after the foamable mixture has reacted and formed a foam product.

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15. The method defined in claim 10 includes forming free-flowing loose-fill agglomerates of the coated particles.

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16. The method defined in claim 10 includes forming free flowing loose-fill agglomerates of the coated particles and with a binder material that sets to hold the particles together.

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17. The method defined in claim 10 includes forming panels or other shaped products from the coated particles.

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18. The method defined in claim 17 includes forming panels or other shaped products by mixing the coated particles with a binder material.

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19. The method defined in claim 18 wherein the binder material at least substantially fills interstices between coated particles in the products.

20. The method defined in any one of claims 17 to 19 includes forming panels or other shaped products having a uniform distribution of coated particles, whereby the insulation material can resist a fire coming from any direction.
21. The method defined in any one of claims 17 to 20 includes applying metal facings or non-metal facings to the panels or other shaped products.
22. The method defined in any one of claims 10 to 20 includes manufacturing the insulation material from particles having a range of different particle sizes.
23. The method defined in any one of claims 10 to 22 includes manufacturing the insulation material by coating the particles with a range of different coating thicknesses.
24. The method defined in any one of claims 10 to 23 includes manufacturing the insulation material with layers of different sized particles and/or different coating thicknesses so that the insulation and fire resistance properties of the insulation material varies through its cross section.
25. The method defined in claim 24 includes manufacturing the insulation material with smaller particles and a thicker fire resistant coating located near the surfaces of the material and larger particles and a thinner coating located in the interior.

26. The method defined in claim 24 or claim 25 includes forming the layers with a binder material to hold the particles together within a layer and to hold the layers together.
- 5 27. The method defined in claim 26 includes incorporating microspheres of glass or ceramic material (a) into the adhesive layer binding the facings to the insulation particles to improve the fire resistance at that boundary and/or (b) in the binder material as a filler to reduce the interstices between particles and thereby improve the insulation and the fire resistance.
- 10 28. The method defined in claim 27 wherein the microspheres are hollow.
- 15 29. The method defined in any one of claims 10 to 28 includes manufacturing the insulation material from particles of different insulation materials.
- 20 30. The method defined in claim 29 includes manufacturing the insulation material from combustible insulation materials and incombustible insulation materials.
- 25 31. A method of manufacturing an insulation material that includes coating an open celled foam of a combustible insulation material with a material that is fire resistant and contributes to the rigidity of the insulation material.
- 30 32. The method defined in claim 31 includes coating the open celled foam by impregnating the foam with the fire resistant material.
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33. The method defined in claim 31 or claim 32 wherein the insulation material is suitable for structural applications.
- 5 34. The method defined in any one of claims 31 to 33 wherein the fire resistant material is sodium silicate or an intumescent material.
- 10 35. A product that includes the insulation material defined in any one of claims 1 to 9.